International Labour Organization

▶ ILO brief

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Asia-Pacific Sectoral Labour Market Profile: Information technology and other information services*

Key points

- The information technology (IT) and other information services sector[2] is a high productivity sector. It is also an enabler of output growth across many industries. The sector's contributions to the digital economy has had significant bearings on resilience within economies over the course of the COVID-19 crisis.
- Despite being a largely capital-intensive industry, the IT and other information services sector has been growing in terms of total employment. Around 9.4 million people work in the sector in the Asia-Pacific, up from 4.8 million in 2011; this represents an increase from 0.27 per cent as a share of total employment in 2011 to 0.50 per cent in 2021.
- Employment in the IT and other information services sector is characterised by relatively high rates of wage and salaried employment, falling informal employment and relatively high skill demands. A significant challenge is the relatively low share of women working in the sector
- The IT and other information services sector is an enabler of jobs. However, technological advancement has also contributed to the enabling of digital labour platforms, which poses more problems in terms of decent work deficits.
- The COVID-19 pandemic has underscored the importance of a digitalised economy, and the challenges of the digital divide. The main challenge in terms of decent work will be in establishing appropriate governance for areas of work enabled by this sector, including digital labour platforms, while also increasing participation of women through education and skills.

* This brief is published as a companion piece to the ILO Asia–Pacific Employment and Social Outlook 2022: Rethinking sectoral strategies for a human-centred future of work. It is a product of the ILO Regional Office for Asia and the Pacific. Other sectoral labour market profiles are also available on the same web page. This brief was prepared by Richard Horne with substantive contributions from Sara Elder and Christian Viegelahn.

[2] The information technology and other information services sector corresponds to International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4 divisions 62 (computer programming, consultancy and related activities) and 63 (information service activities) of major group J (information and communication).

▶ Overview

The information technology (IT) and other information services sector is fundamental to a country's digital economy. Further, resilience to the COVID-19 pandemic was largely determined by the ability of enterprises and workers to shift to online activities and working remotely, which both are enabled by IT and other information services. At the same time, the IT and other information services sector is crucial to enabling different types of work, including across sectors and new forms of work including digital labour platforms.

The IT and other information services sector is a subset of the information and communications technologies (ICT) sector, which is a services sector. IT can be defined as 'the technology involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data'.[3] Other information services can be defined as 'establishments supplying information, storing and providing access to information, searching and retrieving information, operating Web sites that use search engines to allow for searching information on the Internet, or publishing and/or broadcasting content exclusively on the Internet'.[4]

This brief provides an overview of the characteristics of the IT and other information services sector, with a focus on employment characteristics and sectoral governance. The first section looks at economic characteristics of the sector, followed by employment trends. The following section provides an overview of characteristics of those employed in the sector before looking at sectoral governance factors. The brief concludes by considering the industry outlook for the promotion of decent work.

▶ Sectoral economic and employment trends

The IT and other information services sector is the backbone of the digital economy

There is an absence of region-wide data for the IT and other information services contribution to gross domestic product (GDP). Using the 'Post and telecommunications' sector as a proxy, the sector accounts for around 1.5 per cent of GDP in 2020 in the 24 Asia-Pacific countries with data available.[5] Where national data exists for the broader information and communication technology (ICT) sector, the contribution to GDP is estimated at 4.8 per cent in China (2015), 7.9 per cent in India (2018), 7.2 per cent in Indonesia (2016) and 4.1 per cent in Singapore (2019).[6]

The IT and other information services sector also needs to be considered for its indirect contributions to economic growth. The IT and other information services sector is an enabler for workers and enterprises to adopt new technologies, develop new products, reach new markets and operate more efficiently. Accordingly, the sector is an important driver of productivity growth.

Moreover, as observed during the COVID-19 pandemic, a country's level of digitalization also has significant implications for their resilience to the pandemic. The ability to work from home or remotely, was determined by the nature of the work, but also by access to the internet and technology. Further, the pandemic also saw an increase in enterprises shifting to online activities, including new ways of working, and for maintaining or building access to markets. These had implications for enterprise adaptation and resilience during the pandemic and again was largely determined by technological advancement and access to the internet. In low-income countries, for example, where digitalisation and access to technology is lower, there were less opportunities to shift to online platforms or use digital platforms to weather the impact of the pandemic crisis.

[3] Definition derived from dictionary definition of information technology.

[4] US BLS (n.d.). Other Information Services: NAICS 519.

[5] ILO estimates based on Asian Development Bank, Multi-regional Input-Output (MRIO) Database.

[6] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

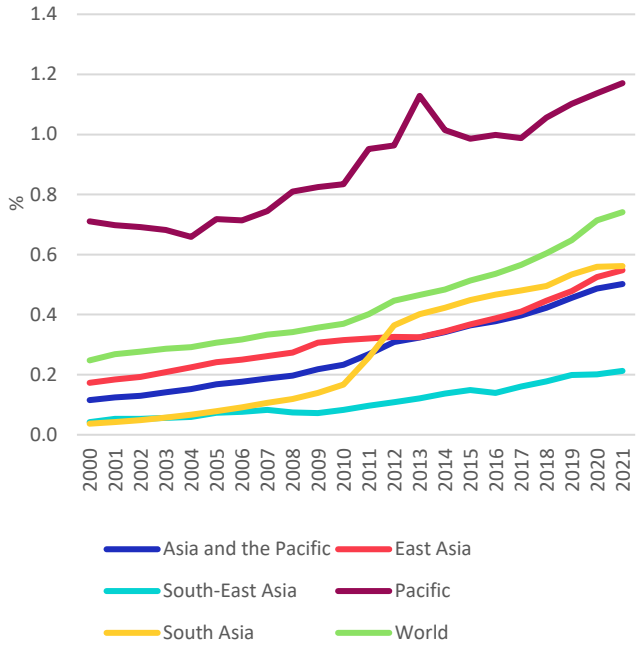
Employment in the IT and other information services sector is rapidly expanding

Around 9.4 million people were working in the IT and other information services sector in Asia and the Pacific in 2021. This represents an increase of more than 7 per cent per annum over the last decade. East Asia accounts for the majority of jobs in the region, at 51 per cent, followed by South Asia at 39 per cent. Growth in total numbers in the sector is fastest in South Asia and Southeast Asia at over 9 per cent per annum over the last decade.

As a share of total employment, the sector accounts for only 0.50 per cent of total employment in Asia and the Pacific as a whole (figure 1). This is up from 0.26 per cent a decade earlier. Notably as a share of total employment, the sector is behind the global average of 0.74 per cent, which highlights its growth potential. It is also a source of new jobs, with nearly 40 per cent of new job titles (as an indicator for new types of occupation) under ICT operations and user-support technicians created in India between 2004 and 2015, and more than 20 per cent in Malaysia between 1998 and 2008.[7]

The contribution of IT and other information services to total employment is higher if the digitally enabling factors are taken into account. Digitally enabling sectors contribute to growth in consumption and output in other sectors and create efficiency gains. As a result, while the net employment impact is typically positive, the composition of employment changes. For instance, in India, simulations suggested that digitally enabled sectors experienced labour demand increases between 2010-14; still, efficiency gains did result also in employment losses in sectors such as accommodation services, education services, financial and insurance services and land transport services and transport services via pipelines.[8]

► **Figure 1. Share of IT and other information services in total employment, 2000-21 (per cent)**



Source: ILO modelled sectoral estimates, November 2022.

Employment growth in the sector is consistent with the findings of a study by the ADB (2018) which suggests that employment in the Asia-Pacific region is shifting toward occupations and industries requiring high cognitive, social, and ICT task intensity.[9]

A challenge for the sector is the relatively low employment of women. In the Asia-Pacific region as a whole, women accounted for a total of 25.1 per cent of all employment in the IT and other information services sector (figure 2). By subregion, female employment as a share of total employment in the sector was lowest in South Asia (20 per cent) followed by the Pacific (24 per cent). The share was highest in South-East Asia at 32 per cent.

There are also suggestions that female participation in emerging information and communication (ICT) sectors, including artificial intelligence, are also lacking in the region.[10] In India, the share of women in senior level positions in the IT and other information services sector

[7] Asian Development Bank (ADB), Asian Development Outlook 2018: How Technology Affects Jobs, 2018.

[8] ADB, Capturing the Digital Economy: A proposed measurement framework and its applications, 2021; and UNCTAD, Digital Economy Report: Value creation and capture: Implications for developing countries, 2019.

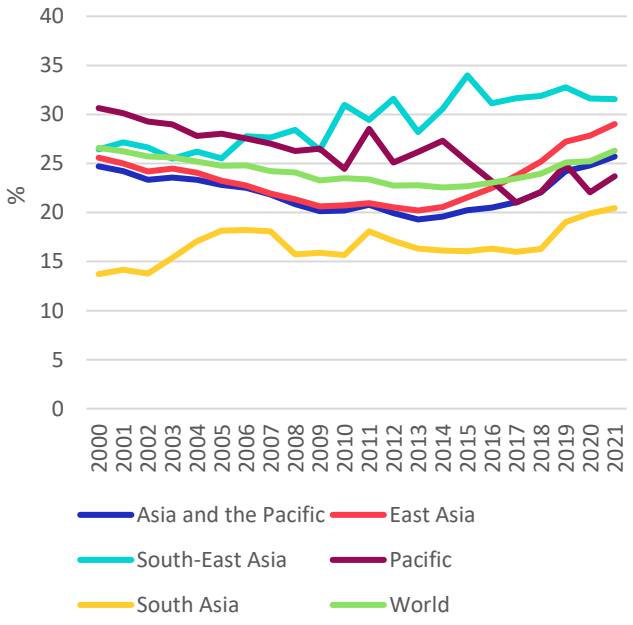
[9] Asian Development Bank (ADB), Asian Development Outlook 2018: How Technology Affects Jobs, 2018.

[10] Liu, Yongwang and Zhenxiong Fan, The digital divide and COVID-19: Impact on the socioeconomic development in Asia and the Pacific, UNESCAP Working Paper Series, 2022.

was much lower than that of middle management and entry level. Around 2013-14, in 'software and IT services' the share of women at senior level was only 5 per cent, compared to 14 per cent at entry level, similarly, in IT Enabled Services (IReS) and Business Process Outsourcing (BPO), only 2 per cent of employment at senior level were women, compared to 28 per cent at entry level.[11]

Low female participation in the IT and other information services sector is not strictly an Asia-Pacific phenomenon; globally, the share of women in the sector is only 26 per cent. However, only East Asia and South-East Asia exhibited a higher female share than the global average, suggesting that significant improvements could be made, particularly via education and skills training targeted towards women and girls.

► **Figure 2. Share of women in IT and other information services employment, 2000-21 (per cent)**



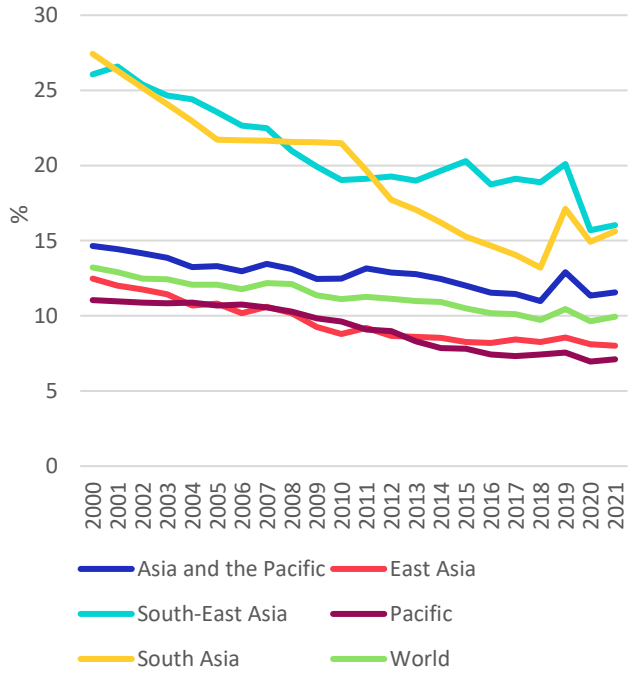
Source: ILO modelled sectoral estimates, November 2022.

The youth share of total employment in the IT and other information services sector has been decreasing over the past decade. In 2021, around 11.6 per cent of the sector in the Asia and the Pacific region were youth (aged 15-24) – a rate that is higher than the global rate of 9.9 per cent (figure 3). For Asia and the Pacific, this represents a decrease of 1.6 percentage points from 13.1 per cent a decade earlier.

By subregion, the share of youth in the sector is highest in South-East Asia, at 16 per cent, followed by South Asia at 15.6 per cent. It was lowest in the Pacific at 7.1 per cent. South Asia and South-East Asia exhibited the largest percentage point decline over the last decade of youth in this sector.

In 2021, the sector absorbed less than 1 per cent (1.1 million) of young workers in employment. This highlights not necessarily that there is a lack of available jobs for youth in the sector, but that the level of skills and job experience required for such work is likely to exclude many in the 15-24 age group. Youth who stay longer in education to acquire skills in the realm of programming and IT should have a better chance of emerging as young adults gaining employment in the IT and information services sector.

► **Figure 3. Share of youth in IT and other information services employment, 2000-21 (per cent)**



Source: ILO modelled sectoral estimates, November 2022.

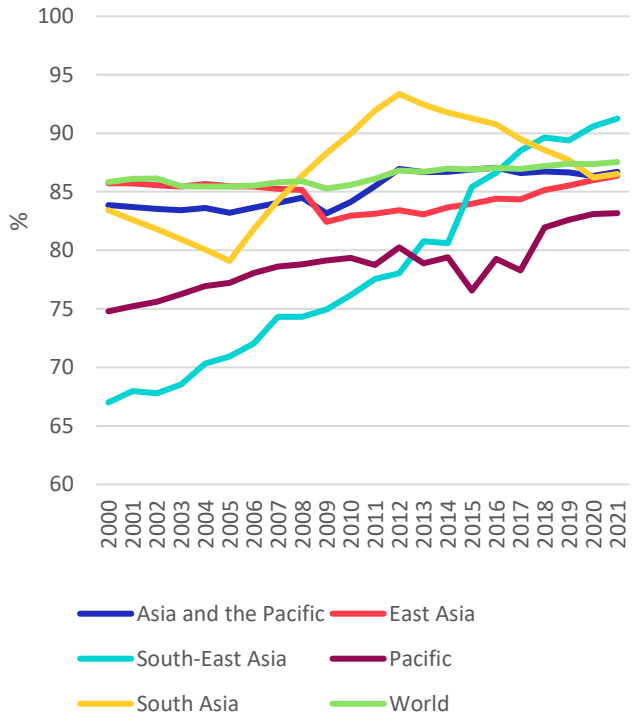
[11] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

▶ Employment characteristics in IT and other information services

Employment in the sector is driven by high skilled work, with decreasing decent work deficits

The majority of employment in the IT and other information services sector is wage and salaried employment, accounting for 86.7 per cent of all jobs in the sector in 2021 (figure 4). For all Asia-Pacific subregions there has been a steady increase in wage and salaried employment in this sector over the last decade. The exception is South Asia where the wage and salaried employment share in the sector decreased from 91.9 per cent in 2011 to 86.5 per cent in 2021.

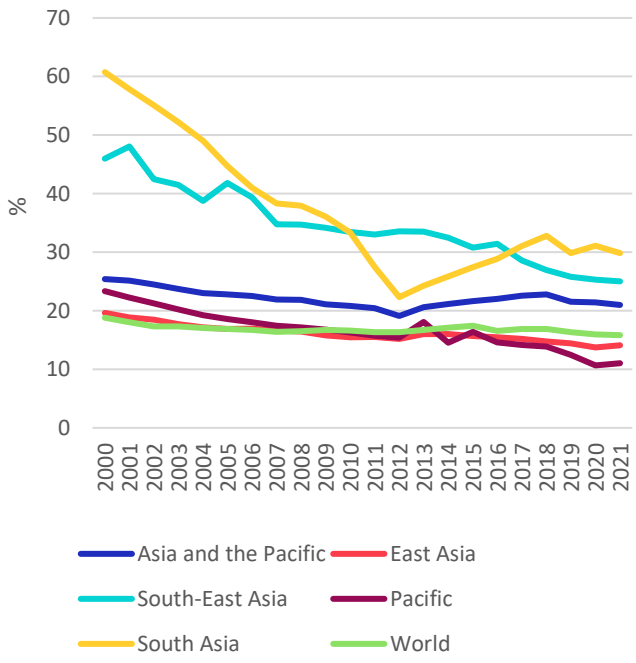
▶ **Figure 4. Share of wage employees in total employment in IT and other information services, 2000-21 (per cent)**



Source: ILO modelled sectoral estimates, November 2022.

In 2021, the highest rate of wage and salaried employment in the Asia and the Pacific region was observed in South-East Asia at 91.3 per cent. South Asia has a large proportion of ICT workers who perform activities through digital labour platforms.[12] As discussed later in this brief, many of whom are classified as self-employed. Hence, it is possible that the decrease in South Asia, particularly in India, is driven by increasing numbers of IT and other information services workers choosing alternative platforms for work.

▶ **Figure 5. Informal employment share of employment in IT and other information services, 2000-21 (per cent)**



Source: ILO modelled sectoral estimates, November 2022.

The decrease in wage and salaried employment in the South Asia region corresponds also with a rise in informal employment in the subregion. The share of informal workers in the IT and other information services sector in South Asia increased from 27.5 per cent to 29.8 per cent during 2011-21 (figure 5). This is significantly higher than

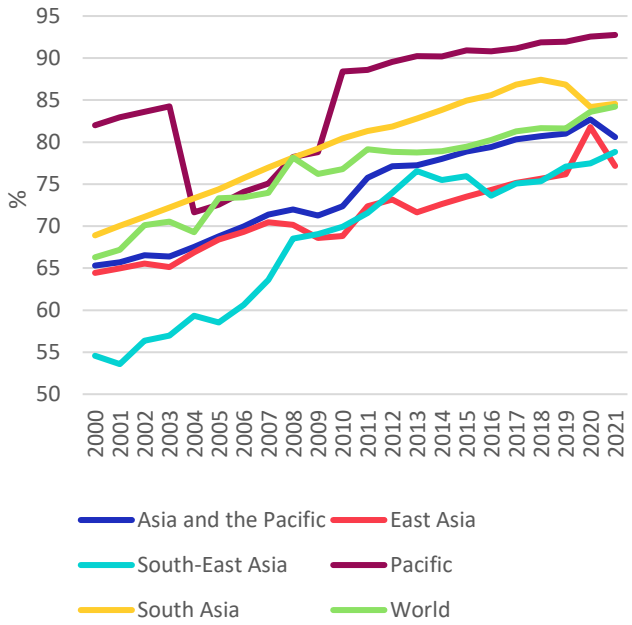
[12] ILO, World Employment and Social Outlook 2021: The role of digital labour platforms in transforming the world of work, 2022.

the average for the Asia-Pacific region overall, at 21 per cent. The informal employment share was also relatively elevated in the sector in South-East Asia at 25 per cent. East Asia and the Pacific Islands exhibited an informal employment share of 14.1 per cent and 11 per cent, respectively. It should be noted that these percentages are very low compared to other sectors.

The IT and other information services sector is relatively highly skilled. Nearly 81 per cent of workers in the sector in 2021 in the Asia and the Pacific region were employed in high-skill occupations (figure 6).[13] This is similar for all subregions in Asia and the Pacific, with the share ranging from 77 per cent in East Asia to 93 per cent in the Pacific. There has been a rise in the share of the high skilled in the sector over the last decade, from 76 per cent in 2011 for the Asia-Pacific as a whole. This is similar to global trends and likely reflects the growing complexity of activities within the IT and other information services sector driven by technological advancement and the need for higher skilled workers.

The skill levels of the sector inversely correlate with the share of the sector in low paid employment. In 2021, a total of 4.7 per cent of all employees in the sector were in low paid employment (based on an hourly measure).[14] This represents a decrease from 9.5 per cent in 2011 and 21.4 per cent in 2001. It suggests that the sector is increasingly a source of employment for higher paid employment, highlighting the importance of ensuring equal access and opportunities for different groups in the sector, particularly through investing in education and skills development for targeted groups.

► **Figure 6. Share of high skilled workers in total employment in IT and other information services, 2000-21 (per cent)**



Source: ILO modelled sectoral estimates, November 2022.

A study by the ILO on ICT and the future of work found that there were widespread skills shortages in the ICT workforce.[15] This was partly attributable to rapid changes in technology, its impact on the world of work, and therefore the skills required to do certain jobs. In Thailand, for instance, a survey in 2017 suggested there was a shortage of around 450,000 ICT specialists in the country. In India, the industry association NASSCOM concluded that the country's IT and business-process management industry was short on around 140,000 ICT specialists in 2018.[16] The skill needs vary by country, with Indonesia noting that there was a shortage of those with advanced or tertiary levels of education in ICT and in China there were specific needs around the integrated circuit industry.[17]

[13] High skilled workers are those in the international Standard Occupational Classification (ISCO) 2008 categories of ISCO-08 categories 1-3, which are professional, associate and technicians categories.

[14] The share of low paid employees is defined as the share of wage employees whose wages are below two thirds of the median hourly wage in a given country and year. The hourly wage is calculated from data on wages and actual hours worked available in national labour force surveys. See Annex 3 of ILO, Asia–Pacific Employment and Social Outlook 2022: Rethinking sectoral strategies for a human-centred future of work for information on the estimation methodology used to produce regional aggregates.

[15] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

[16] Akella, Bhavana. Shortage of skilled IT workforce looms over India: NASSCOM, Communications Today, 15 February 2019.

[17] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

► Sectoral governance and promotion of decent work

The main decent work challenges may lie in the work mediated through digital labour platforms

There are relatively low levels of decent work deficits in the IT and other information services sector. However, the IT and other information services sector plays an instrumental role in facilitating, developing or enabling digital labour platforms for the wider economy. Platform work is transforming the world of work and presenting new challenges to the traditional employer-employee relationship, resulting in gaps and grey areas in regulation and employment protection legislation.

Digital labour platforms can be classified into two main categories; (i) online web-based platforms, whereby tasks and activities can be performed online or remotely by workers, and (ii) location-based platforms, that are carried out in-person, but the services are ordered and secured via the digital platforms. In both cases, the digital labour platforms mediate work between the client and the worker providing the service.[18]

The challenge of these digital labour platforms for workers are that they are often subject to irregular work, poorer working conditions, lack of freedom of association and rights to collective bargaining, and ineligibility to social protection. The lack of social security for these platform workers was made particularly apparent during the COVID-19 pandemic. Whether a worker is considered to be an employee or self-employed depends on the work relationship of the platform. Where workers are directly hired by a platform they are categorised as employees, whereby when their work is mediated through a platform they are categorised as self-employed by the platform.[19]

Those working as employees for the platform are typically those working in the development and functionality of the platform and are typically the minority. Despite this, for what data exists in some developing countries, software developers accounted for the largest share of ICT specialists that were engaged in online platform work.[20] However, the vast majority of workers associated with digital labour platforms being those whose work is mediated through the platforms, and therefore the self-employed.

Many of these workers whose work is mediated through digital labour platforms are working in the IT or other information services sector. For instance, BPO companies are increasingly relying on online web-based platforms for providing their services and expanding their client base. Further, large technology companies are increasingly outsourcing tasks to workers in developing countries.

Low levels of unionization may reflect lack of decent work deficits in the sector

In an ILO study of the ICT sector in seven countries on the 'Future of work and the ICT sector', it was found that employers' associations in the ICT sector were active in all countries, but there were few unions representing ICT workers. This may be the result of relatively few decent work deficits in the ICT sector, given the highly skilled nature of much of the sector, and relatively high wages. However, it could also be due to new forms of organising work. In India and Indonesia, trade unions in the ICT sector have only recently been established, owing to labour disputes.

In the ICT sector, tripartite constituents have sought to address issues such as skills development, networking, mobility, gender equality and non-discrimination, ageing, working-time arrangements, platform work and mental health.

Platform workers are unable to engage in collective bargaining. A major challenge is that in some jurisdictions, the self-employed, which is the majority of those using the

[18] ILO, World Employment and Social Outlook 2021: The role of digital labour platforms in transforming the world of work, 2022.

[19] ILO, World Employment and Social Outlook 2021: The role of digital labour platforms in transforming the world of work, 2022.

[20] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

digital labour platforms, are prohibited from engaging in collective bargaining under competition law. Further, the geographical and cross-border disbursement presents an additional challenge. The geographical and cross-border disbursement in particular, highlights the need for some degree of region-wide policy dialogue and coordination.

Education and skills development in IT need to be targeted towards women and girls

Policies and investment in the digital economy fall under the mandates of different ministries, departments or establishments, including labour, education, skills, technology and immigration.[21] For instance, the Ministry of Skill Development and entrepreneurship in India and SkillsFuture Singapore. Much of the focus is on establishing and building skills in the digital economy, this can overlap different ministries and departments, and can relate to labour migration policy, particularly to fill skill gaps and to benefit from digital skill and knowledge transfer from other countries. A number of countries have implemented favourable visa policies with an eye to attracting highly skilled ICT workers.[22]

There is a particular need to increase participation of women in the IT and other information service sector. This requires gender-responsive ICT policymaking,[23] including allocating percentages of resources towards promoting and supporting engagement and participation by women, digital literacy training for women and girls. Skills and training programmes need to be developed taking into consideration the needs of women and girls, with options and opportunities for different skill and education levels.

The Women in Science, Technology, Engineering and Maths (STEM) Workforce Readiness and Development Programme implemented by the ILO between 2017 and 2020, is an example of a programme designed to bolster women's participation in high growth areas, including ICT.[24] Currently, low participation by women in STEM is associated with a number of factors including gender stereotypes and gender norms,

Policy measures adopted by countries include the provision of vocational orientation and guidance, coding competitions, women's awards, the identification of female role models, and the establishment and strengthening of women's professional networks.[25] Efforts to encourage women's advancement in the sector can also be done through the implementation of family-friendly policies, including return-to-work assistance for young mothers.[26]

Digital economy coming under increased scrutiny

In the last few years there is increasing attention being placed on the digital economy – to which the ICT sector is central – from a number of angles. For a start, it is difficult to define the digital economy, and institutions including the International Monetary Fund (IMF), Asian Development Bank (ADB) and UNCTAD, are among many institutions attempting to improve measurement of the digital economy, to better understand the contribution to growth and the avenues in which it impacts growth.[27] A driving factor to this has been the contribution to digital labour platforms as mentioned earlier, as well as its role in the creation of new digital technologies and their impact on the labour market, including artificial intelligence, blockchain and other technologies, particularly those enabling automation and displacement of jobs.

Related to better understanding of the digital economy is also better understanding and defining digital employment. In this regard, there have also been efforts

[21] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

[22] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

[23] Brudvig, I., Working towards closing the digital gender gap in Asia, Web Foundation, 2020 (3 April).

[24] ILO, Women in STEM Workforce Readiness and Development Programme.

[25] ILO, Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany, India, Indonesia, Singapore and Thailand, Synthesis report, 2021.

[26] See, for instance, the "Action Plan for supporting a thriving digital sector" in The Business Growth Agenda: Building a Digital Nation, New Zealand. ILO, Preparing for the future of work: National policy responses in ASEAN +6, Annex 1. Labour markets and technological change, 2019.

[27] IMF, Measuring the Digital Economy, 2018; ADB, Capturing the Digital Economy: A proposed measurement framework and its applications, 2021; and UNCTAD, Digital Economy Report: Value creation and capture: Implications for developing countries, 2019.

by different institutions to attempt to define digital employment, including direct digital employment and digitally enabled employment. Better defining and understanding digital employment, along with the digital economy, will facilitate improved and more effective policymaking and labour market governance, including skills prioritisation and planning for the future of work.

► Way forward and prospects for decent work

As discussed in this brief, the IT and other information services sector has been growing rapidly in terms of total employment. Further, that the sector is characterized by relatively few decent work deficits, with high rates of wage and salaried employment, low rates of low paid employment and falling informality. The main challenges for the sector itself is its limitation as a major source of job creation and the low shares of female participation in the sector, particularly the higher value-added activities and more senior positions. Accordingly, one major policy option is to invest further in education and skills for women and girls and to promote policies that encourage employment of women in the sector. A number of initiatives are underway in the region and over time, increased female participation will help shift gender norms and further encourage a more gender equal participation.

One of the more pressing challenges for the region, which some might argue is beyond the scope of the IT and other information services sector, is the enabling impact of the sector on new forms of work including work obtained via digital labor platforms. While workers who obtain work via mediation on the platforms are not employees, it is associated with digitalization and the impacts on the labour market.

Finally, developments in defining the digital economy, digital employment and the role of each in the economy and the labour market, will be fundamental to improved policymaking in the Asia-Pacific region, and safeguarding for changes underway with the future of work.

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